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ABSTRACT

In most interest inventories, a single stimulus item is presented and the respondent indicates a preference in terms of degree of like, dislike, or indifference. This approach provides normative scales with scores that may be compared with various group distributions. The forced choice of options adds to the score on the scale for option selected and lowers the possible score for the option not selected. The purpose of this study was to construct a career exploration inventory using forced choice items and to determine if the consistency and concurrent validity of scale scores could be enhanced. The Career Type Inventory (CTI) was constructed with an occupations list, a list of environmental activities associated with the occupations, and a list of learning activities associated with entering the occupations listed. The instrument was administered to 142 male and 208 female 10th graders. Results were compared to data from the Self-Directed Search (SDS) (J. Holland, 1994). Chi square analysis indicated that all distributions were significantly different from each other except for combined aspirations versus combined CTI scores. The combined CTI score distribution was also not significantly different from the expected population distribution. There were congruency mean differences between the CTI and SDS samples, so that it was difficult to compare them directly. The fact that male and combined CTI means were higher than their respective SDS means suggests that the psychometric structure of the CTI may have contributed to a closer relationship between scale scores and aspirations. One cannot tell if one inventory is superior to the other unless both are administered to the same representative group. (Contains four tables and six references.) (SLD)

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ED 414 294

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Improving Career Exploration Using Psychometric Technology

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The design of interest inventory item types tends to be similar across most inventories. A single stimulus item is presented and the respondent indicates a preference in terms of degree of like, dislike, or indifference. This type of item provides normative scales with scores that may be compared with various group distributions. The Kuder interest inventories (Kuder and Diamond (1979)) are exceptions to the rule, using item triads requiring the choice of a most liked and a least liked option among the three possibilities. This format produces ipsative scale scores where the forced choice of options not only adds to the score on the scale for option selected, but also lowers the possible score on the scale for the option not selected. If options from all scales are paired an equal number of times then the summary scores for each scale form a rank order of preference from highest to lowest for all scales.

Problem

Two of the most widely used career exploration systems, the Self-Directed Search (SDS, Holland, 1994) and the Career Decision-Making System (CDM, Harrington & O'Shea, 1993) use the highest ranking scores to form two or three letter codes to focus exploration. Both have interest scales with normative formats which sometimes produce less differentiated scale scores. The purpose of this study was to construct an inventory using forced choice items and to determine if the consistency and concurrent validity of scale scores could be enhanced.

Instruments

The data collection instruments for this study included a demographic information sheet that asked the respondent to indicate up to three occupational aspirations, when they were made, and which they thought was most realistic choice. For the purposes of this study the occupation designated for analysis was the most realistic choice, or the most recent choice if a most realistic was not indicated.

A Career Type Inventory was also constructed which was made up of three parts. One part consisted of an occupations list similar to that on the Strong Interest Inventory (SII, Harmon, et al., 1994), which was arranged in ascending order of occupational prestige for each scale. The purpose of this arrangement was to reduce prestige bias in choices of options within items. A second part consisted of environmental activities associated with these occupations as described in the Guide for Occupational Exploration (GOE, U.S. Department of Labor, 1979). The third part consisted of learning activities associated with entering the occupations listed. For example, training in journalism (learning activity) was associated with being a reporter (occupation) who writes news articles (in a work environment). Items in each part were arranged in the same order as the occupations part. The six scales of the inventory parallel the Holland (1994) Realistic (R), Investigative (I), Artistic (A), Social (S), Enterprising (E), and Conventional (C) vocational typology model. The respondent was asked to choose two options which described them best in each item set of four possibilities, each of which represented a different scale. Summary scores for each scale were used in this study.

Item analysis established Cronbach alpha coefficients ranging from .79 to .95 with a median of .90 for the scales, indicating good internal consistency. Rotated factor analysis of

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the six scale intercorrelations indicated that the scales formed three bi-polar factors (.61 to .94 loadings): R vs S, I vs E, and A vs C. Rotated factor analysis of items within each scale revealed that in general, the parallel items in each part formed clusters associated with the GOE interest classification system.

Procedures

The instruments were administered to a class of 142 male and 208 female 10th grade students in a northeastern USA high school. The results were then analyzed as follows: To answer the question concerning consistency of responses a procedure suggested by Holland (1994) was used. Holland's hexagonal model proposes that consistency of response is indicated by the proportion of two letter codes (two highest scale scores) that represent adjacent (high consistency), alternate (moderate consistency) and opposite (low consistency) scale positions on the hexagonal model. These proportions were calculated for the subjects occupational aspirations codes as determined from the Dictionary of Holland Occupational Codes (Gottfredson & Holland, 1989), and their CTI results. Means based on a rating of 3 for high, 2 for moderate and 1 for low consistency were then compared with similar data for the SDS (Holland, 1994).

Two procedures were used to analyze the concurrent validity of aspirations and CTI results. The first was to compare the first letter of the aspiration code with the first letter (highest score) on the CTI for each subject. This comparison classifies results in a scale of first letter same on both (4), adjacent on hexagon on other (3), neither adjacent or opposite (2), or opposite (1). These means of these values were contrasted with those reported for the SDS (Holland, 1994).

The second approach to congruence was to calculate the Iachan Index of agreement between the first three letter codes of aspirations and inventory scores. Holland (1994) indicates that the Iachan Index is the most accurate technique for these comparisons. The Iachan Index ranges from 0 to 28. For example, if both codes are identical the match of both first letter has a value of 22, the second letter 5, and the third letter 1. Values of 26 to 28 represent very close, 20-25 reasonable close, 14 to 19 not close, and 0-13 poor matches. Mean Iachan Indices were calculated for the CTI data and compared with similar data for the SDS (Holland, 1994).

Results

Table 1 indicates the distribution of first letter codes and highest scale scores for aspirations, and the CTI and SDS inventories. A Chi-Square analysis indicated that all distributions were significantly different from each other at the $p < .05$ level or higher, except for combined aspirations versus combined CTI scores. The combined CTI score distribution was also not significantly different from the expected population distribution.

Table 2 shows the results for consistency of two letter codes. It indicates that both the female aspiration mean was higher than the female CTI mean, and the combined aspiration mean was higher than the combined CTI mean at the $p < .001$ level. There were no significant differences in means within the aspirations or CTI score groups. However, the SDS female mean was higher than the CTI female mean at the $p < .01$ level. Within the SDS score groups the female mean was higher than the male mean ($p < .001$) and the combined mean ($p < .05$), and the combined mean was higher than the male mean at the $p < .05$ level.

Table 3 shows the results for congruence of first letter codes. Within the CTI groups no means were different from each other. The male SDS mean was lower than the female

SDS mean ($p < .001$) and combined SDSmean ($p < .05$). All CTI means were significantly higher than all SDS means at the $p < .001$ level.

Table 4 shows the results for three letter Iachan Index congruence. Within the CTI groups again no means were different from each other. The male SDS mean was again lower than the female SDS mean at the $p < .05$ level. The CTI male mean was higher than the SDS male mean ($p < .01$), and the CTI combined mean was higher than the SDS combined mean ($p < .01$).

Conclusions

The following limitations of this study should be noted in considering the results. Direct comparison of SDS and CTI results in tenuous since they were administered to different population samples. Additionally Holland (1994) does not provide data to judge the consistency of occupational aspirations for his samples so it is difficult to determine reasons for congruency mean differences between the CTI and SDS samples.

Table 1 results suggest that the CTI first letter aspirations were distributed similarly to the CTI first letter scores, and that the combined CTI first letter score distribution was similar to what might be expected in the general population. The fact that the SDS groups tended to be less evenly distributed across the primary code types suggests a possible reason for differences in congruency scores.

Table 2 indicates that the consistency of two letter codes is quite similar across aspirations, and CTI and SDS scores. Within the SDS groups males tended to be less consistent. CTI aspirations means tended to be higher than CTI score means. Also the female SDS score mean was higher than the female CTI score mean. This suggests a trend toward slightly more consistent responses for females, but no differences in consistency between combined groups on CTI and SDS scores.

Table 3 results suggest that female SDS aspirations were most congruent with their SDS scores, but all SDS mean congruency scores were lower than the CTI congruency scores. As suggested earlier in discussing Table 1 this may be due to comparatively uneven distributions of high point codes for SDS scores and disparities between that distribution and the SDS aspirations. If the SDS aspiration distribution was similar to the CTI aspiration distribution in Table 1, one would expect lower congruence scores for the SDS.

Table 4 reflects similar results as in Table 3. The major differences were that fewer CTI congruency means were higher than SDS congruency means. It would appear that the improved accuracy in using the three letter Iachan Index reduced the differences in mean scores. That is, the addition of second and third letter matches improved the reliability of individual congruency scores and made them more similar between the CTI and SDS groups. However, the fact that the male and combined CTI means were higher than their respective SDS means suggests that the psychometric structure of the CTI may have contributed to a closer relationship between scale scores and aspirations. Obviously, one cannot tell if either inventory is superior to the other in this respect unless both are administered to the same representative group.

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TABLE 1
Distribution of first letter codes for aspirations and CTI and SDS scores
(Aspirations and CRI = 350 10th grade students; SDS = 4616 High School students)

	Aspirations			CTI			SDS		
	m%	f%	c%	m%	f%	c%	m%	f%	c%
R	29	2	13	35	1	15	40	0	4
I	25	14	19	22	13	16	23	8	15
A	9	24	18	8	28	19	8	13	11
S	13	38	28	4	35	22	20	67	45
E	18	14	15	25	9	16	6	1	4
C	5	8	7	6	14	11	3	11	7
n	142	208	350	142	208	350	2169	2447	4616

Significantly different distributions (Chi-Square):

1. All distributions are different from each other at $p < .05$ or higher except for combined aspirations vs combined CTI codes.

2. The combined CTI distribution is not different from the expected population distribution.

TABLE 2
Consistency of two-letter codes (CTI = 350 10th grade students; SDS = 819 High School students)

Group	Adjacent High %	Alternate Moderate %	Opposite Low %	n	Mean	S.D.
CTI Aspirations						
A. Male	61	25	13	142	2.47	.72
B. Female	53	45	2	208	2.51	.54
C. Combined	56	37	6	350	2.50	.62
CTI Scores						
D. Male	50	41	9	142	2.41	.65
E. Female	46	43	12	208	2.34	.68
F. Combined	47	42	11	350	2.37	.67
SDS Scores						
G. Male	48	39	13	344	2.35	.70
H. Female	57	37	6	475	2.52	.60
I. Combined	53	38	9	819	2.44	.64

Significantly different means:

1.	CTI aspirations:	No means are different from each other.
2.	CTI Scores:	No means are different from each other.
3.	SDS Scores:	Female mean higher than male mean ($p < .001$); and combined mean ($p < .05$). Combined mean higher than male mean ($p < .05$).
4.	CTI aspirations vs CTI scores:	Female aspiration mean higher than female CTI mean ($p < .001$). Combined aspiration mean higher than combined CTI mean ($p < .001$).
5.	CTI vs SDS scores:	SDS female mean higher than CTI female mean ($p < .01$).

TABLE 3
Congruence of first letter code between aspiration and inventory scores
CTI = 350 10th grade students; SDS = 812 High School students)

Group/ Gender	% Same on both	% Adjacent on other	% Not adjacent nor opposite	% Opposite on other	n	Mean	S.D.
	First letter code						
A. CTI m	75	13	6	7	142	3.55	.90
B. CTI f	77	15	7	2	208	3.67	.61
C. CTI c	76	14	6	4	350	3.62	.91
D. SDS m	35	29	23	13	327	2.87	1.04
E. SDS f	48	24	21	7	485	3.12	.98
F. SDS c	43	26	22	10	812	3.02	1.01

Significantly different means:

1. CTI: No means are different from each other.
2. SDS: Male mean lower than female mean ($p < .001$); and combined mean ($p < .05$).
3. CTI vs SDS: All CTI means higher than all SDS means ($p < .001$).

TABLE 4

Congruence of three letter codes (Iachan index) between aspirations and inventory. CTI = 350 10th grade students; SDS = 259 14-18 yr. olds)

	CTI			SDS		
	M	F	C	M	F	C
n	142	208	3.44	119	140	259
Mean	20.32	20.56	20.47	17.49	19.51	18.57
S.D.	7.39	6.96	7.14	8.39	7.94	8.07

Significantly different means:

1. CTI: No means are different from each other.
2. SDS: Female mean higher than male mean ($p < .05$).
3. CTI vs SDS: CTI male mean higher than SDS male mean ($p < .01$).
   CTI combined mean higher than SDS combined mean ($p < .01$).